



State of Utah

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NEWS RELEASE

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The Science of Lightning

Lightning Safety Awareness Week Continues

How Powerful is Lightning?

Each bolt of lightning can reach over five miles in length, soar to temperatures of approximately 50,000 degrees Fahrenheit, and contain 100 million electrical volts.

Lightning is a Random, Chaotic, and Dangerous Fact of Nature!

At any given moment, there are 1,800 thunderstorms in progress somewhere on the earth.

Ice in the Cloud is Critical to the Lightning Process.

In a thunderstorm, ice particles exist which vary in size from small ice crystals to larger hailstones. In the rising and sinking motions within the storm, collisions between the particles occur. This causes a separation of electrical charges. Positively charged ice crystals rise to the top of the thunderstorm, and negatively charged ice particles and hailstones drop to the middle and lower parts of the storm.

How Does Lightning Develop Between the Cloud and the Ground?

A moving thunderstorm gathers another pool of positively charged particles along the ground that travel with the storm. As the differences in charges continue to increase, positively charged particles rise up taller objects such as trees, houses, and telephone poles. The negatively charged area in the storm will send out a charge toward the ground called a stepped leader. It is invisible to the human eye, and moves in steps in less than a second toward the ground. When it gets close to the ground, it is attracted by the positively charged objects, and a channel develops. You see the electrical transfer in this channel as lightning. There may be several return strokes of electricity within the established channel.

Thunder.

The lightning channel heats rapidly to 50,000 degrees. The rapid expansion, then contraction of air in the lightning channel causes the thunder. Since light travels faster than sound in the atmosphere, the sound will be heard after the lightning. If you see lightning and hear thunder at the same time, that lightning is in your neighborhood!

Negative Lightning and Positive Lightning.

Not all lightning forms in the negatively charged area low in the thunderstorm cloud. Some lightning originates in the cirrus anvil at the top of the thunderstorm. This area carries a large positive charge. Lightning from this area is called positive lightning. This type is particularly dangerous for several reasons. It frequently strikes away from the rain core, either ahead or behind the thunderstorm. It can strike as far as 10 miles from the storm, in areas that most people do not consider to be a lightning risk area. Also, positive lightning usually carries a high peak electrical current, which increases the lightning risk to an individual.